

REMARKS

Applicants thank the Examiner for the very thorough consideration given the present application. Claims 1 and 3-16 remain in the application and claims 1, 8, 11 and 16 are independent. Claims 11-15 remain withdrawn from consideration by the Examiner. The Office Action dated January 27, 2010 has been received and carefully reviewed. Each issue raised in the Office Action is addressed below. Reconsideration and allowance of the present application are respectfully requested in view of the following remarks.

Examiner Interview

Responsive to receipt of the final rejection, Applicants' representative Paul T. Sewell contacted Examiner Satish Chandra to request an interview to discuss the rejections of record. Applicants and Applicants' representative wish to thank Examiner Chandra for the courtesies extended during the personal interview, which was conducted at the USPTO on March 25, 2010. Primary Examiner Jeffrie R. Lund also participated in the interview by telephone and his assistance was also greatly appreciated. Applicants specifically wish to thank Examiner Chandra and Primary Examiner Lund for facilitating the advancement of the prosecution by suggesting language that they agreed would avoid the applied prior art, as reflected in the Interview Summary mailed March 31, 2010 indicating same.

During a lengthy discussion of the teachings of the prior art references Examiner Chandra and Primary Examiner Lund agreed that the applied art failed to show or suggest the formation of multiple layers on the reaction chamber surfaces after cleaning and prior to the reintroduction of substrates and suggested that the addition of such language would avoid the applied prior art, but would likely require an additional review or search. Accordingly, Applicants have amended independent claims 1, 8 and 16 to include the suggested clarification, worded in a manner consistent with the antecedent language already in the claims, and are believed to avoid the applied prior art and place the application in condition for allowance. Applicants again wish to thank Examiner Chandra and Primary Examiner Lund for their assistance in advancing the prosecution in this manner. The above confirms the previous statement of the substance of the interview.

Reference to Divisional Application

It is noted for the record that Divisional Application Serial No. 12/403,667 was filed on March 13, 2009, directed to a method restricted from this application in the Office Action dated July 10, 2007. Applicants wish to bring to the Divisional Application to the Examiner's attention with respect to the prior art cited therein.

Claim Rejections – 35 U.S.C. § 103

Claims 1-4, 6, 8-10 and 16 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Toyoda in view of Saito and Kim. Applicants submit the Examiner has failed to establish a *prima facie* case of obviousness and respectfully traverse the rejection. A complete discussion of the Examiner's rejection is set forth in the Office Action, and is not being repeated here.

In order to establish a *prima facie* case of obviousness under 35 U.S.C. § 103(a), the cited references must teach or suggest each and every element in the claims. See MPEP § 706.02(j) and MPEP §§ 2141-2144.

Applicants respectfully submit that this rejection is improper for a number of reasons. First, the base reference to Toyoda is directed to a substrate processing apparatus for film deposition including a reaction container 1 in which process time may be reduced by lowering process temperature by means of the introduction of plasma activated hydrogen for pretreatment cleaning through holes 14 of discharge tube 7 prior to forming a layer of SiGe. Since it is not necessary to raise the hydrogen gas to a temperature higher than the temperature necessary for film deposition, the time for raising and lowering the cleaning process temperature may be avoided. Toyoda only shows a film deposition system in which plasma is limited to discharge tube 7, which controls diffusion of the charged particles from the plasma. This reduces damage to the substrate 2, as described in paragraph [0018] to be deposited with a film of SiGe as described in paragraph [0022]. Toyoda does not discuss post cleaning processing. More specifically, Toyoda does not discuss a cleaning gas supply system for supplying cleaning gas which removes accretion adhering to an inner side of the reaction container by subjecting the

reaction container to the desired processing, as recited. And Toyoda also does not discuss a post-processing gas supply system for supplying post processing gases after the cleaning gas is supplied, and before the substrate is placed in the container, by the controller to independently and alternately supply all of the reaction gases through exclusive supply nozzles to form layers on reaction container surfaces prior to processing of a subsequent substrate. Instead, the base reference to Toyoda has provided no showing or suggestion regarding any post film formation cleaning, post-processing cleaning or the formation of multiple layers on a reaction container surface by the alternate application of reaction gases. Thus, the base reference to Toyoda is significantly different than what is claimed and, in no way, discloses or suggests the claimed invention.

Second, the secondary reference to Saito appears to disclose a reaction container 11, an exhaust port 61, a gas supply system 35a, 35b, 35c and 35d for supplying reaction gases to the reaction container and a controller 75 for controlling the gas supply system. The gas supply system includes a cleaning gas supply unit 35d for supplying cleaning gas and the third embodiment, starting with paragraph [0175] describes a post-processing gas supply of nitrogen gas after the cleaning step. Saito fails to show or suggest a controller that controls the post-processing gas supply unit to supply all of the post-processing gases to form multiple layers on reaction container surfaces, where all of the post-processing gases include all of the reaction gases supplied alternately to form layers on the reaction container surfaces. Therefore, the secondary reference to Saito neither discloses nor suggests a controller that controls the post-processing gas supply unit to supply all of the post-processing gases alternately through exclusive supply nozzles, where all of the post-processing gases include all of the reaction gases supplied alternately to form layers on the reaction container surfaces, as recited in claims 1, 8 and 16. Finally, the Office Action refers to Kim at paragraph [0011] for a valve controller for alternately supplying the reaction gases. But Kim has nothing to do with controlling the application of post-processing gases. In Kim, the controller 30 discussed in paragraph [0011] is merely the conventional controller for the alternate application of process gases during atomic layer deposition on a substrate in the reaction container. Kim has only a brief disclosure in paragraph [0034] related to supplying a cleaning gas subsequent to the feeding of any of the

reactive gases. There is no disclosure in Kim of a controller for controlling a cleaning process and for controlling a post-processing process as in the instant claims. Kim clearly fails to address the specific claimed features of a controller or control apparatus controlling the cleaning gas supply unit and the post-processing gas supply unit to alternately supply the reaction gases to form multiple layers on the reaction container surfaces, and therefore cannot remedy the deficiencies of Toyoda or Saito, as was agreed to in the Examiner Interview. Accordingly, the Office Action fails to make out a *prima facie* case of obviousness of the subject matter recited in currently pending claims 1, 8 and 16.

With regard to dependent claims 2-4, 6, 9 and 10, Applicants submit that claims 2-4, 6, 9 and 10 depend, either directly or indirectly, from independent claims 1 and 8, respectively, which are allowable for the reasons set forth above, and therefore claims 2-4, 6, 9 and 10 are allowable based on their dependence from claims 1 and 8. Reconsideration and allowance thereof are respectfully requested.

Claim 5 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Toyoda in view of Saito and Kim, and further in view of Fukuda. This rejection is also respectfully traversed. Fukuda was cited to show a “nozzle 22 for supplying a gas containing fluorine (NF₃) tied into the same nozzle which supplies a nitrogen gas via nozzle 5.” With all due respect, it is not clear what connection there might be concerning the two cleaning gases NF₃ and Nitrogen, as in Fukuda, and the supply of a cleaning gas containing fluorine and a reaction gas containing silicon, as in claim 5. Fukuda fails to establish the connection between these entirely different issues as to claim 5. Moreover, Fukuda also fails to show or suggest a controller that controls the post-processing gas supply unit to supply all of the post-processing gases alternately through the exclusive supply nozzles, where all of the post-processing gases include all of the reaction gases supplied alternately to form multiple layers on reaction container surfaces, and therefore cannot remedy the defects of Toyoda, Saito and Kim as discussed above, the comments of which are incorporated herein. Reconsideration and withdrawal of this rejection are respectfully requested.

Claim 7 stands rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Toyoda in view of Saito and Kim, and further in view of Choi. This rejection is also respectfully traversed. Choi was cited to show ClF₃ as the cleaning gas. However, Choi merely uses ClF₃ for

cleaning and there is no disclosure of a controller for controlling cleaning and post-processing at all, much less a controller that controls the post-processing gas supply unit to supply all of the post-processing gases alternately through the exclusive supply nozzles, where all of the post-processing gases include all of the reaction gases supplied alternately to form multiple layers on reaction container surfaces, and therefore Choi cannot remedy the defects of Toyoda, Saito and Kim as discussed above, the comments of which are incorporated herein. Reconsideration and withdrawal of this rejection are respectfully requested.

Conclusion

All objections and rejections raised in the Office Action having been properly traversed and addressed, it is respectfully submitted that the present application is in condition for allowance. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Notice of same is earnestly solicited.

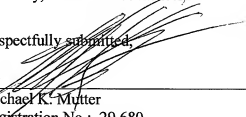
Prompt and favorable consideration of this Amendment is respectfully requested.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone Paul T. Sewell, Registration No. 61,784, at (703) 205-8000, in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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